INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: Preparation of Bio-waste derived Heterogeneous Catalysts for Methanolysis and Peroxidation Reactions

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SHORT ABSTRACT

Apatite is a group of phosphate minerals which is available both in the form of synthetic as well as natural. Hydroxyapatite ($Ca_5(PO_4)_3(OH)$) is one of such apatite which is the mineral form of calcium apatite and is a potential candidate for catalyst preparation. There are few differences between synthetic and natural hydroxyapatite. Natural HAp has better dynamic response to the environment, high catalytic activity and good thermo-chemical stability than the synthetic HAp. As far as solubility and activity is concerned, crystallographic structure plays an important role. In line to synthetic HAp, the natural HAp has perturbed nanostructures and nonstoichiometric composition with low hydroxyl content. As physical and chemical properties depend on structure, natural HAp will lead to good results. Because of these properties HAp can be used as a heterogeneous catalyst.

Groundnut shell, an agricultural waste produced in enormous amount is usually either discarded or often burnt. However, groundnut shell is considered as a potential adsorbent material, which is viable in terms of both economic and environmental prospective. Hence, it is considered as eco-rich agricultural by-product. There are many works reported on groundnut shell as very good adsorbents for water/wastewater treatment containing both heavy metals as well as organic pollutants such as phenol, dye etc.

To increase the surface properties and the activity during reactions, various metals and metalloids were doped on to these materials. Finally, five catalysts were prepared. These developed catalysts were characterized using various analytical techniques. Then the catalysts were used for methanolysis and peroxidation reactions of Neem oil and waste cooking oil. The reusability study of the catalysts was also carried out to observe the chemical stability of the catalyst.